

Heat transfer inside the inclined natural-ventilated roofs

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Roof ventilation is an effective passive way to reduce the heat flux into building envelope and curb the space cooling load in summer time. In order to optimize the thermal performance of ventilated roofs, both CFD simulation and experiments are carried out to study the airflow rate, roof surface temperature, and ventilated heat due to buoyance effect inside the ventilated cavities characterised by different inclinations, aspect ratios, and surface emissivity under constant heat flux conditions. Considering the thermal radiation and natural convection inside the ventilated cavity, the thermal resistance of the ventilated cavities are correlated to the Rayleigh number and roof parameters after data reduction. The obtained results can provide a useful tool for the building engineers to quantify the thermal resistance of ventilated building envelope.

Keywords: ventilated roof, natural convection and radiation, roof thermal resistance.